Skill Practice 9

Practice Problems
Average Atomic Mass

Name: KEY
Date: _____
Hour: _____

1. A certain element exists as three different isotopes. 24.1% of all the isotopes have a mass of 75.23 amu, 48.7% have a mass of 74.61 amu, and 27.2% have a mass of 75.20 amu.
   a. What is the average atomic mass of this element?

$0.241(75.23) + 0.487(74.61) + 0.272(75.20) = 74.9199$

   b. Use your periodic table to determine which element this is.

Arsenic (As)

2. An element exists as 4 different isotopes. 4.35% have a mass of 49.9461 amu, 83.79% have a mass of 51.9405 amu, 9.50% have a mass of 52.9407 amu, and 2.36% have a mass of 53.9389 amu.
   a. What is the average atomic mass of this element?

$0.0435(49.9461) + 0.8379(51.9405) + 0.0950(52.9407) + 0.0236(53.9389) = 51.9959$

   b. What is the identity of this element?

Chromium (Cr)

3. Calcium has three different isotopes. One has a mass of 35.00 amu; another has a mass of 41.00 amu; and another has a mass of 40.00 amu. Which isotope is the most abundant of the three? (HINT: Look at the periodic table at calcium's average atomic mass.)

Calcium = 40.08 amu

Calcium-40 is most abundant; 40.08 is closest to 40.

4. Several isotopes of a certain atom "X" exist. 4.35% of all X atoms have a mass of 49.946 amu. 83.79% have a mass of 51.941 amu, 9.50% have a mass of 52.941 amu, and 2.36% have a mass of 53.939 amu. What is the average atomic mass of atom X?

$0.0435(49.946) + 0.8379(51.941) + 0.0950(52.941) + 0.0236(53.939) = 51.9959$

Cr same as #2

SAMPLE BONUS QUESTION:

A newly discovered element Q has two isotopes: Q-270 and Q-271. The average atomic mass of Q is 270.24. Find the percent abundance of Q-270 and Q-271.

SOLUTION: Let x = % abundance of Q-271.
Let $(1-x)$ = % abundance of Q-270.

$$x(271) + (1-x)(270) = 270.24$$

$$271x + 270 - 270x = 270.24$$

$$(271x - 270x) + 270 = 270.24$$

$$x = 270.24 - 270$$

$$x = 0.24$$

$$(1-x) = 0.76$$

Therefore Q-271's % abundance is 24%
Q-270's % abundance is 76%.